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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/778,996	02/07/2001	Konstantinos I. Papathomas	END920000065US1	8725

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EXAMINER

SELLERS, ROBERT E

ART UNIT

PAPER NUMBER

1712

DATE MAILED: 10/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/778,996

Applicant(s)PAPATHOMAS, KONSTANTINOS
I.**Examiner**

Robert Sellers

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 14, 18, 41, 43, 44, 46, 58-62 and 82-98 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 14, 18, 41, 43, 44, 46, 58-62 and 82-98 is/are rejected.
- 7) ☒ Claim(s) 87, 90, 93 and 96 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 88 and 94 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1. There is no antecedent basis for the first flexibilizer of claims 88 and 94 in independent claims 1 and 41 wherefrom they depend. Claims 1 and 41 merely define a flexibilizer as opposed to the "first flexilibilizer" of claims 88 and 94.

Claims 1, 14, 18, 41, 43, 44, 46, 59, 61, 62, 83, 85 and 86 are rejected under 35 U.S.C.103(a) as being unpatentable over Shiobara et al. Patent No. 5,225,484.

Claims 58, 60, 82, 84, 87, 90-93 and 96-98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiobara et al. as applied to the claims hereinabove, and further in view of Christie et al. Patent No. 5,668,059 and Papathomas et al. Patent No. 6,790,473.

Claims 89 and 95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiobara et al. as applied to the claims hereinabove, and further in view of the Materials Research Society Symposium article by Shi et al.

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2. Claims 87 and 93 defining 3',4'-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate as the epoxy resin of independent claims 1 and 41, respectively, as well as claims 90 and 96 denoting β -(3,4-epoxycyclohexyl)ethyltrimethoxy silane as the coupling agent on the spherical or spheroidal particles of claims 14 and 46, respectively, were inadvertently included in the rejection of Shiobara et al. alone although the proper rejection is their incorporation into the rejection of Shiobara et al. in view of Christie et al. and Papathomas et al.

3. Shiobara et al. is open to the use of epoxy resins in general (col. 1, lines 32 and 51-53) and Christie et al. (col. 6, lines 33-38 and col. 15, Example 1) and silane coupling agents (col. 8, lines 35-36) shows a preferred 3',4'-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate and β -(3,4-epoxycyclohexyl)ethyltrimethoxy silane as a coupling agent for the treatment of a filler (col. 1, lines 32 and 51-53). It would have been obvious to employ the 3',4'-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate of Christie et al. as the epoxy resin of Shiobara et al. in order to improve the fatigue life (Christie et al., col. 2, lines 65-67 and col. 3, lines 32-35). It would have been obvious to treat the spherical silica of Shiobara et al. with the β -(3,4-epoxycyclohexyl)ethyltrimethoxy silane of Christie et al. as the silane coupling agent of Shiobara et al. in order to enhance the affinity between the filler and the epoxy resin matrix.

Otherwise, the rejections are maintained for the reasons of record set forth in the non-Final rejection mailed June 15, 2006. The arguments filed September 7, 2006 have been considered but are unpersuasive.

4. Shiobara et al. (col. 9, lines 17-34) depicts an epoxy-silicone copolymer designated as a flexilbiizer (col. 8, lines 15-17) and containing epoxy-reactive secondary hydroxyl groups in the moieties $\text{-OCH}_2\text{CH(OH)CH}_2\text{O-}$, thereby conforming to the claimed "functional groups capable of reaction with the epoxy or cyanate ester resin" present in claims 1 and 41.

5. Based on the equivalent components of an epoxy resin, preferably from about 5 to about 50 parts by weight per 100 parts by weight of epoxy resin plus curing agent (col. 7, lines 39-43) of a flexibilizer, from about 1 to about 15 per 100 parts by weight of epoxy resin plus curing agent (col. 2, lines 46-47 and col. 4, lines 30-34) of a thermoplastic resin, and spherical silica between Shiobara et al. and the claims, the composition of Shiobara et al. inherently possesses the higher fracture toughness, lower viscosity and increased thermal shock resistance at a temperature excursion of below -40°C than if the flexibilizer were not present as required in claims 1 and 41.

6. Although Christie et al. does not recite the amount of the coupling agent of about 0.25% by weight in claims 14 and 46, it would have been obvious to treat the spherical silica of Shiobara et al. with the coupling agent of Christie et al. at a level which optimizes the compatibility of the filler with the epoxy resin matrix within the claimed amount.

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7. Shiobara et al. (col. 1, lines 11-16 and col. 8, lines 45-52) teaches the mounting of semiconductor flat packages on printed circuit boards wherein the semiconductors are encapsulated. The general description of encapsulating a semiconductor mounted on a printed circuit board encompasses the semiconductor electrically coupled to a substrate having an encapsulant positioned against at least a portion of the edge of the semiconductor of claim 18.

8. Shiobara et al. (col. 7, lines 46-56) espouses the use of spherical silica for "reducing the coefficient of expansion," thereby falling within the ambit of the claimed spherical or spheroidal filler having a negative coefficient of thermal expansion of claims 59 and 83.

9. Shiobara does not recite the presence of solvents, thereby conforming to the claimed less than 0.2% by weight of non-reactive organic solvents of claims 61 and 85 which includes zero percent by weight.

10. Based on the equivalent components of an epoxy resin, preferably from about 5 to about 50 parts by weight per 100 parts by weight of epoxy resin plus curing agent (col. 7, lines 39-43) of a flexibilizer, from about 1 to about 15 per 100 parts by weight of epoxy resin plus curing agent (col. 2, lines 46-47 and col. 4, lines 30-34) of a thermoplastic resin, and spherical silica between Shiobara et al. and the claims, the composition of Shiobara et al. inherently possesses the coefficient of thermal expansion, glass transition temperature and Shore D hardness of the cured composition as set forth in claims 62 and 86. Such a characteristic is conditional upon the curing of the compositions of claims 1 and 41 and is not an affirmative limitation.

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11. According to column 8, line 44 of Shiobara et al., "[t]he order of blending the components is not critical." It would have been obvious to pre-blend the epoxy resin and flexibilizer of Shiobara et al. before the introduction of the filler as defined in claim 41 in order to ensure a uniform distribution of the flexibilizer within the epoxy resin matrix before the addition of the filler.

12. It would have been obvious to perform the blending of the components of Shiobara et al. under vacuum as required in claim 43 in order to prevent the contamination of the composition.

13. Papathomas et al. remains applicable under 35 U.S.C. 102(e)/103(a) until evidence that the instant application and the reference were subject to an obligation of assignment to the same corporation at the time the invention was made (MPEP § 2136.01, Status of U.S. Application as a Reference under section II).

14. The motivation for employing the zirconium tungstate of Shi et al. as the inorganic filler of Shiobara et al. is found in the CAPLUS abstract, AB section, lines 1-7 wherein a negative coefficient of thermal expansion is attributed to zirconium tungstate when introduced into an epoxy composite.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Sellers whose telephone number is (571) 272-1093. The examiner can normally be reached on Monday to Friday from 9:30 to 6:00. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).



Robert Sellers
Primary Examiner
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